Plant community development after seven growing seasons in the two experimental wetland basins

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Introduction

Since 1994, we have been monitoring the plant cover and species richness in the two experimental basins at the Olentangy River Wetland Research Park (ORWRP). In May 1994, Wetland 1 was planted with 2,400 individuals of 13 species of native wetland plants while Wetland 2 was left unplanted as a control (Mitsch et al., 1998). The hypothesis regarding these basins was that "planted and unplanted basin will be similar in function in the beginning, diverge in function during the middle years and ultimately converge in structure and function" (Mitsch et al., 1998).

This paper presents interpretation of aerial photography at the ORWRP in October 2000, the end of the seventh growing season for these basins. The first six years are summarized by Mitsch et al. (2000). The objective was to determine the spatial patterns of plant communities within the two wetlands and to determine if convergence is occurring or if divergence, as noted in 1999, continues to occur.

Methods

A color aerial photograph taken by ODOT in October 2000 was used to outline the wetland areas and the dominant vegetation communities for 2000. The photograph was scanned and imported into Arcview 3.2. Different colorscale areas were identified and a number of polygon layers for vegetation communities were constructed. Field checks were undertaken in late October to verify the accuracy of the interpretation of the 2000 photograph. With spatial analysis in Arcview 3.2, those polygons were exported to raster (gridscale) files to compute percentage of area for each vegation community.

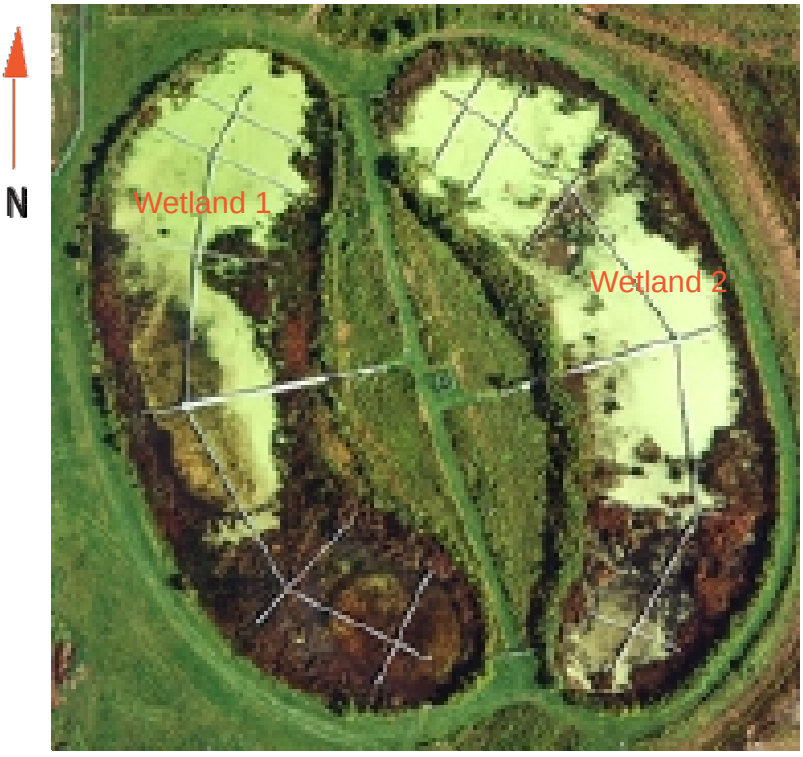

Figure 1. Aerial photograph with blank/white color in October 2000 for the two experimental wetland basins (Wetland 1 and Wetland 2).

Results and Discussion

Wetland 1 had approximately 46% vegetation cover and Wetland 2 had an estimated 49% vegetation cover in 2000 (Table 1; Figure 2). These numbers indicate vegetation cover in Wetland 1 was less than in 1999 when there was 63% cover while a decrease in vegetation cover from 66% vegetation cover in Wetland 2 in 1999 (Mitsch et al, 2000). Since 1994, when there was no vegetation cover, coverage has increased yearly, with Wetland 1 having greater percent coverage than Wetland 2 until 1997, when that trend reversed.

Figure 3 presents dominant vegation community patterns from 1994 - 2000. Table 2 shows coverge (m^2) in each basin by each dominant vegetation communities between 1994 - 2000.

Figure 4 shows that coverage of major vegetation communities have changed since 1994:

1) *Typha* dominance has increased dramatically in Wetland 2 since 1996 while it generally has remained less than 17% of the vegetation in Wetland 1. At the end of the growing season, *Typha* was 45% of the total area of Wetland 2 while only16% of the total area of the originally planted Wetland 1.

2) Schoenoplectus tab. dominanace increased in both basins from 1995 to 1997 and was 47% and 48% of the total area for Wetland 1 and Wetland 2, respectively. After 1997, the coverage of *Schoenoplectus tab.* for both basins decreased. At the end of growing season of 2000, *Schoenoplectus tab.* was only 9% and 3% of total area of Wetland 1 and Wetland 2, respectively.

3) *Nelumbo lutea,* an aquatic species present in the deepwater areas in 1998, did not reappear as a dominant species in 1999 or 2000 in Wetland 1. The species was 1% of the total area of Wetland 1 in 1997 and 1998 and 0.4% of the total area of Wetland 2 in 1998.

4) *Sparganium eurycarpum* has been a major community in Wetland 1 since 1997 and was 16% of the total area of Wetland 1 in 2000. *Sparganium eurycarpum* has never occurred in Wetland 2.

Table 1. Coverage (%) in each of the experimental wetlands by each dominant vegetation species in 2000.

Communitiy	W1	W2
Emergent Vegetation		
Schoenoplectus tab.	8.72	3.40
Scirpus fluviatilis	0.15	0
Sparganium eurycarpum	15.80	0
Spartina pectinata	4.21	0
Typha sp	16.62	45.15
Phalaris arundinacea	0.20	0
Total Vegetation	45.70	48.55
Open Water	54.30	51.45
Total	**100**	**100**

5) *Spartina pectinata* accounted for 3% of the dominant vegetation in Wetland 1 and did not appear in the 1998 data as a distinct community; this plant has persisted since the planting on the edge of the wetland and is now forming patches large enough to be seen by aerial photography. *Spartina* increase is likely due to the very dry growing season in 1999 that in turn led to a lower amount of water being added to the experimental wetlands in 2000. *Spartina pectinata* was 0.4% of total area of Wetland 1 in 2000.

6) *Scirpus fluviatilis* first occurred in Wetland 1 in 1997 with 2.3 % of the total area of Wetland 1. *Scirpus fluviatilis* was 6% of the vegetation cover in Wetland 1, a slight decrease from 1998 while was only 0.2 % of total area of Wetland 1 in 2000. It has never occurred in W2.

7) *Phalaris arundinacea* was a new patch in 2000, consisting of only 0.2% of total area of Wetland 1 and found near inflow.

Figure 2 and Table 1 data illustrate another aspect in which the two wetland basins were different in 2000. Six

Table 2. Coverge (m^2) in each basin by each dominant vegetation communities between 1994 -2000

Zone (m^2) that are dominated by	1994		1995		1996		1997		1998		1999		2000	
	W1	W2	W1	W2	W1	W2	W1	W2	W1	W2	W1	W2	W1	W2
Total basin	8903	8672	8903	8672	8903	8672	8903	8672	8903	8672	8903	8672	8903	8672
Open water	1451	2567	7746	8672	5333	5498	3579	3035	3490	2567	3276	2914	4835	4462
Algal mat	7452	6105												
Schoenoplectus tabernaemontani			1157		3205	3018	4149	4163	3668	2333	1914	876	777	295
Typha spp.					365	165	445	1440	98	3772	792	4882	1479	3916
Scirpus fluviatilis							205		392		258		13	
Nelumbo lutea							107	35	89					
Sparganium eurycarpum							418		1166		2261		1407	
Sagittaria latifolia							9							
Spartina pectinata											401		375	
Phalaris arundinacea													18	

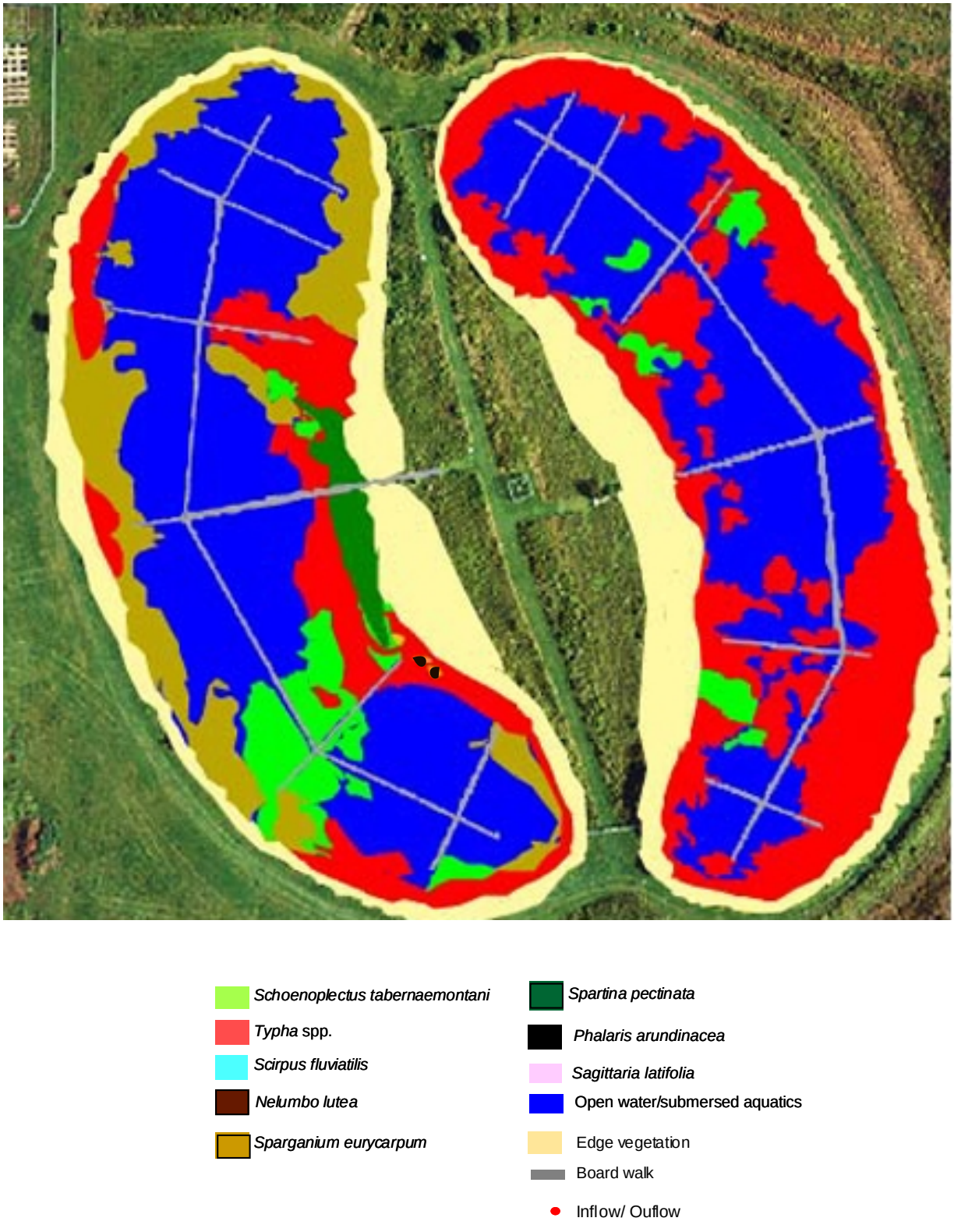

Figure 2. Map of each experimental wetland from October 2000 aerial photograph indicating the areas of dominant species vegetation and open water.

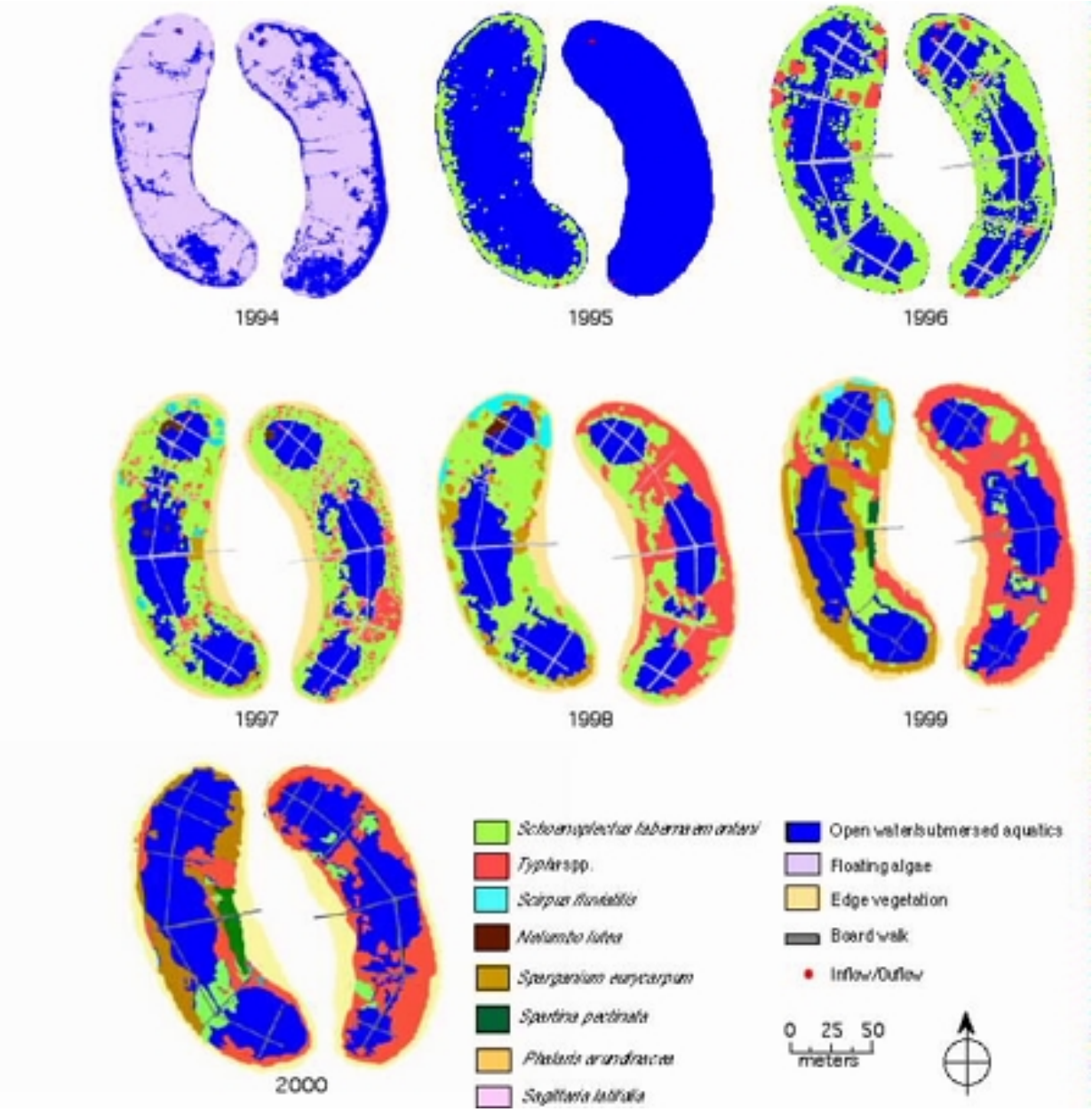

Figure 3. Dominant vegation communities pattern from 1994-2000 in two experimental wetlands.

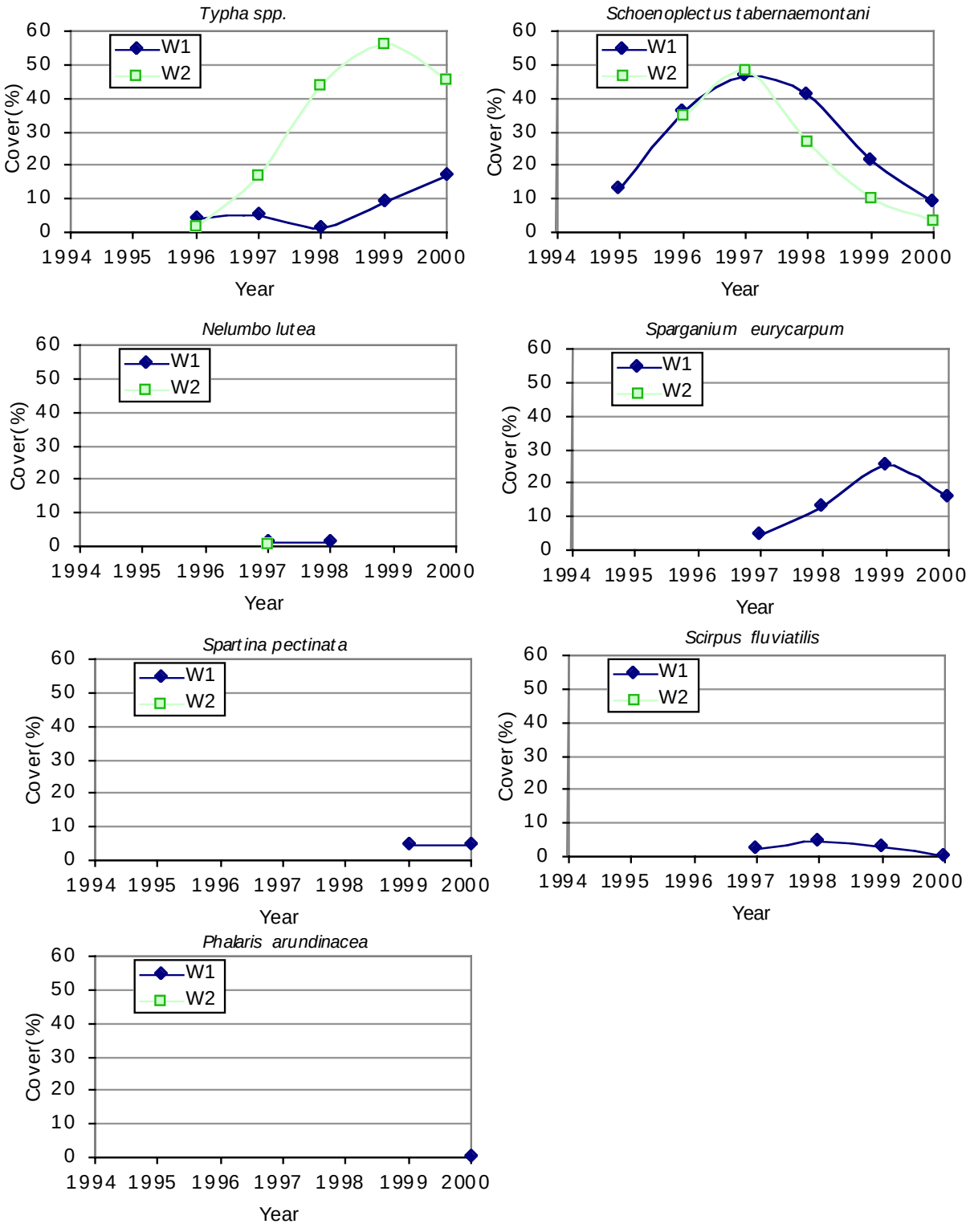

Figure 4. Percent cover of major plant communities over time in two experimental wetlands.

vegetation communities, distinguished by the dominant species, were identified in Wetland 1 while only two were identified in Wetland 2. One of the most significant changes was the decreased coverage by *Schoenoplectus tabernaemontani* in 2000 in both wetlands. In 1998, this species dominated 68% of Wetland 1 vegetation cover and 38% of Wetland 2 vegetation cover. In 1999, the species were 23% and 8%, respectively. In 2000, the extents were 19% and 7%, respectively. Four communities were present in Wetland 1 that were not in Wetland 2 in 2000. They comprised 64% of the vegetation in Wetland 1. Overall, at 34% of the vegetation cover, the dominant species in Wetland 1 was *Sparganium eurycarpum*, a change from the previous year when *Schoenoplectus tabernaemontani* dominated.

In total, six communities had significant areas of vegetation domination in Wetland 1 whereas in Wetland 2 two communities had this role and one, *Typha* spp., was dominant.

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